No, It's Not a Mirage

Gerald Viera

Viera went on a scavenger hunt in the desert.

At Project Gnome, which was part of the Plowshare Program in New Mexico in 1961, my primary duty was the cabling, wiring, and power for all tests. A large diesel generator was in place, and my first responsibility was to ensure the performance of this power source. How do I do that in the desert, 25 miles from town? I spent a day in Carlsbad going to appliance stores and came up with an idea. I rented about 50 used electric stoves for 2 weeks and had them trucked out and set in the desert. Electricians wired them up in three separate circuits. I then turned on all of the burners and ovens to the max and proceeded with the test by turning on one circuit then two, and then three, and then turning one off and on to check the regulation. The maximum load was about 65% of the generator's capacity, which was more than the estimated load needed.

Project Gnome tunnel.

Flood, Fire, and Brimstone

Gary Johnson and Ron Koopman

During the 1970s energy crisis, the international transport of liquefied natural gas (LNG) seemed inevitable. Concerns developed over accidents involving LNG tanker ships in harbors, and Edward Teller pointed out that the energy stored in such a ship would be similar to that of an atomic weapon, implying that a significant spill could be a major disaster. In response, DOE and the Lab quickly formed the Liquefied Gaseous Fuels (LGF) Spill Effects Program in 1977 to predict and mitigate the effects of a major spill. The Lab participated in its first atmospheric dispersion test, called Operation Avocet, in 1978 at China Lake, California. A modest array of instrumentation for measuring natural gas concentration was fielded for that test series. The next 2 years saw development of more extensive instrumentation, and by 1980, a state-of-the-art system was designed and developed, enabling a much more sophisticated test series, called Operation Burro, to be fielded in 1980. At this point, we decided to name our test series after animals observed during our field campaigns.

To investigate a spill scenario in which a cubic mile of flammable gas was dispersed and ignited in a populated area, we performed a series of vapor-burn experiments in 1981, called Operation Coyote. The burning cloud was a spectacular sight, even when viewed from the control trailer park over a mile away. The original program mandate was broadened to include other hazardous liquids, such as liquified petroleum gas (LPG) and ammonia, and experimental and modeling work was initiated with the U.S. Coast Guard, the Fertilizer Institute, and the U.S. Air Force. In 1982, Congress mandated construction of a larger, permanent spill test facility and provided funding in 1983. The Nevada Test Site (NTS) was selected for the facility.

During 1983, large spill tests with ammonia and nitrogen tetroxide, christened Operations Desert Tortoise and Eagle, were performed on Frenchman Flat at NTS, using temporary facilities. Those were difficult times, partly because of skimpy budgets and spartan facilities, but mostly because of the weather. Since spill experiments require a stable atmosphere and a steady wind speed and direction, crew members would sometimes wait for days or even weeks after preparing their experiments.

The low point came when unseasonable torrential rains poured down in Nevada, flooding the normally dry playa. Workers scrambled to raise instruments up on platforms, while standing in water and ankle-deep mud and swatting clouds of mosquitoes. Even four-wheel-drive trucks had problems, and one was almost lost in a submerged ditch, requiring a rescue call for the driver and passenger. Those who worked on the project during that time received the honorary title, "Mud Tech." Many new, uncleared technicians were introduced to LGF fieldwork during that time, and what an introduction it was!

In 1984, construction began on the LGF Spill Test Facility at NTS. At last, the program would have a permanent building with indoor plumbing. The first test at the new facility was a hydrofluoric acid test series in 1986, sponsored by AMOCO. In the following years, the Gas Research Institute and a consortium of oil and chemical companies sponsored tests with LNG and hydrofluoric acid, which were conducted in a large wind tunnel facility. In almost all cases, the data generated in these various experiments were used to develop and validate computer models.

Over the years, the LGF computer models found many uses. For example, when an LPG truck turned over in the Caldecott Tunnel near Oakland and caused a tremendous explosion, LGF models helped determine whether the result was a deflagration or a detonation. We also examined what tunnel features could help reduce the consequences of such a spill in the future as well as how much flammable material to allow in each vehicle passing through the tunnel. The models have been incorporated into the National Atmospheric Release Advisory Center (NARAC) and, over the years, used for predicting the consequences of accidental releases of hazardous chemicals.

Currently operating as the Remote Sensing Test Range, the spill facility is now dedicated to the Lab's counterproliferation projects. But LGF group members still feel lucky to have a special bond of camaraderie that has been built through both hard and good times performing field experiments in the desert.

It does in fact rain in the desert. This is Frenchman Dry Lake in the summer of 1983.